

COOLING TOWERS

A cooling tower can be an energy efficient cooling option but needs to be well maintained to ensure it doesn't waste water.

How cooling towers work

Cooling towers are used in some businesses for process water cooling or as part of an air-conditioning system. The cooling process takes place as heat is transferred to the atmosphere through evaporation of water in the cooling tower.

They consume water through two main processes:

1. Through evaporation - as water evaporates in the cooling process it is required to be replaced as 'make-up' or 'top-up' water.
2. 'Bleed', 'blow-down' or 'dump' cycles - as water is evaporated, concentrations of total dissolved solids (TDS) increase which is detrimental to the efficient operation of the unit. A portion of the water is 'bled off' or periodically 'dumped' to waste and topped up with fresh water to dilute the TDS concentration.

Increases in TDS concentrations can cause scaling, reducing the efficiency of the unit and increasing energy consumption.

Bleed or dump discharges are prompted automatically, manually or determined by a probe reading within a set parameter. When this wastewater is sent to the sewer it is required to meet trade waste TDS limits.



Cooling tower systems in commercial buildings account for an estimated 30% of a site's total water use. This can be as high as 75% in some industrial sites.



Water efficiency tips

- Use the free calculator at mycoolingtower.com.au to check the efficiency of your cooling towers.
- Install a flow meter on the make-up water line to monitor cooling tower water usage. A data logger can be used to monitor water usage patterns more accurately. Regular monitoring of normal usage patterns will help to quickly identify any irregularities or leaks. Regular monitoring can also assist with calculating your Sewerage Discharge Factor (SDF).
- Ensure cooling towers are regularly checked for leaks, faulty float valves, overflowing, splashing or other water losses.
- If discharging cooling tower waste to sewer, set TDS bleed to the maximum trade waste limits. This will maximise the number of times water can be cycled through the tower (i.e. increased cycles of concentration). Consider any dosing adjustment that will be required in conjunction with your service contractor so performance is not compromised.
- Install automatic bleed and dosing equipment controlled by TDS and pH sensors so the tower only bleeds once a set limit has been reached. This ensures the tower is dosed adequately to maximise cycles of concentration. Make sure automatic biocide dosing is in line with the Public and Environmental Health (Legionella) Regulations.
- Ensure bleed solenoids or valves are functioning correctly for both operation and closing.

- Ensure that water efficiency is integral to the servicing agreement with your cooling tower contractors.
- Ensure your service contractor cleans and recalibrates the TDS/pH sensors on a regular basis. These records should all be available from your contractor and stored for future reference. The TDS probe can foul easily and needs regular cleaning.
- Use good quality water for cooling tower make-up. Poor or inadequate quality water may need to be treated prior to topping up a cooling tower. Pre-treatment may consist of filtering or manipulating the water chemistry.
- Consider capture and use of rainwater for make-up water (subject to water quality, service provider recommendations and health considerations). Rainwater generally has a lower TDS than drinking water allowing more cycles of concentration to be achieved. Filtration and/or treatment may be required.
- Ensure drift eliminators are fitted as required by the Public and Environmental Health (Legionella) Regulations
- Consider alternative water treatment methods. Methods such as ozone, ionisation and ultra-violet disinfection may enable towers to operate at higher cycles of concentrations, reducing blow-down, chemical requirements and associated costs.
- Investigate returning condensate from cooling coils back to the tower. This is generally clean cool water. Before commencing any projects they should be discussed with your service provider to ensure there are no detrimental effects on your system.
- Minimise heat loading on towers where possible, for example keep lighting to a minimum and turn off machinery when not required. Consider installing heat exchanges where possible to utilise the heat for pre-feed water to boilers and steam units.

Saving water in business

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